

[JAPANESE] [JP,2002-364833,A]

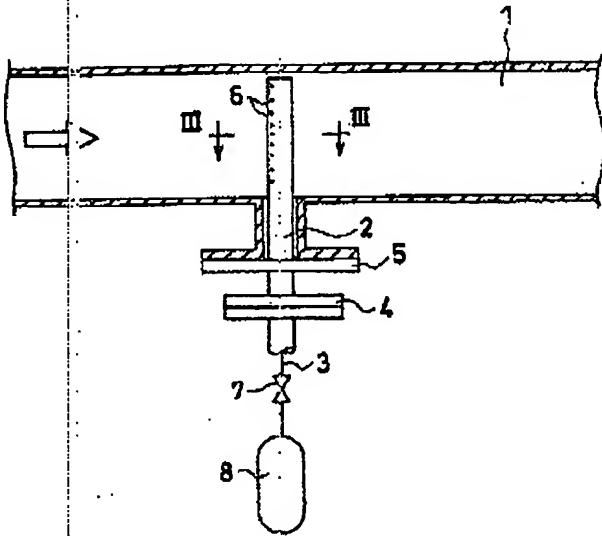
CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM  
MEANS OPERATION DESCRIPTION OF DRAWINGS DRAWINGS

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1. JP 002-364833.A

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Drawing selection ☒ Representative drawing

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**CLAIMS**

[Claim(s)]

[Claim 1] The air supply way for combustion (1) which supplies a combustion air is made for the pipe for oxygen jet (2) to rush into a combustion burner at the condition of intersecting perpendicularly with the elementary stream of a combustion air. Oxygen enricher in the combustion air which arranges two or more oxygen jet holes (6) towards meeting the axis of the pipe for oxygen jet (2) to the peripheral surface of the pipe for oxygen jet (2) located in the improvement style side in a way to which a combustion air flows, and has made free passage connection of the pipe for oxygen jet (2) at the oxygen supply.

[Claim 2] Oxygen enricher in the combustion air according to claim 1 to which the range whose aperture include angle (theta) in the medial axis of the pipe for oxygen jet (2) is 30 - 60 degrees was made to carry out opening of the oxygen jet hole (6) to the flow direction of the combustion air which passes along the medial axis of the pipe for oxygen jet (2).

[Claim 3] Oxygen enricher in the combustion air according to claim 1 or 2 which has arranged two or more oxygen jet holes (6) towards meeting the axis of the pipe for oxygen jet (2) at two or more trains to the peripheral surface of the pipe for oxygen jet (2) located in the improvement style side in a way to which a combustion air flows.

[Claim 4] Oxygen enricher in a combustion air given in any 1 term of claims 1-3 which have enlarged spacing of \*\*\*\*\* oxygen jet holes (6) as it separates in the direction of a periphery from the flow core in the air supply way for combustion (1).

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## DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001] [Field of the Invention] This invention relates to the oxygen enricher which adds oxygen to a combustion air in order to burn a fuel in the state of oxygen enrichment with a metal fusion furnace etc.

[0002] [Description of the Prior Art] In order to raise dissolution effectiveness, he uses oxygen enrichment air as a combustion air, and is trying to acquire an elevated temperature with metal dissolution equipment in recent years. And in order to acquire oxygen enrichment air conventionally, what the nitrogen adsorbent was used. [ what ] and decreased the nitrogen content in atmospheric air is used as a combustion air, or oxygen is added to the atmospheric air which is flowing as a combustion air.

[0003] [Problem(s) to be Solved by the Invention] However, at some which adsorb a nitrogen component and change the ratio of oxygen and nitrogen, with a condition, environmental temperature, etc. of an adsorbent, since variation will arise in the adsorption capacity force, there is a problem that playback or exchange of an adsorbent must be performed frequently, the top where it is difficult to acquire the stable combustion condition.

[0004] Moreover, although an oxygen jet nozzle is made to face the air conduit for combustion, oxygen gas is blown into the combustion air which is flowing from an oxygen nozzle and he is trying to raise the rate of an oxygen ratio in a combustion air in the former when adding oxygen to the atmospheric air taken in as a combustion air, there is a problem that it is difficult to carry out homogeneity mixing only by adding oxygen gas simply even when adding several% of oxygen, and piping long for homogeneity mixing is needed.

[0005] This invention aims at offering the oxygen enricher which can mix the added oxygen gas and a combustion air to homogeneity in a short distance paying attention to such a point.

[0006] [Means for Solving the Problem] In order to attain the above-mentioned purpose, this invention makes the pipe for oxygen jet rush into a combustion burner on the air-supply way for combustion which supplies a combustion air at the condition intersect perpendicularly with the elementary stream of a combustion air, and arranges two or more oxygen jet holes towards meeting the axis of the pipe for oxygen jet to the peripheral surface of the pipe for oxygen jet located in the improvement style side in a way to which a combustion air flows, and it is carrying out having made the free passage connection of the pipe for oxygen jet at an oxygen supply as the description.

[0007] [Function of the Invention] The pipe for oxygen jet is made to rush in into the air supply way for combustion in the condition of intersecting perpendicularly with the flow direction (elementary stream) of the combustion air which flows the inside of the air supply way for combustion in this invention. Since it arranges in the condition of meeting the axial center of the pipe for oxygen jet, to the peripheral surface of the pipe for oxygen jet located in the improvement style side in a way to which a combustion air flows, two or more oxygen jet holes By turbulent flow formation by the airstream which flows along the front face of the pipe for oxygen jet exfoliating, the oxygen from the pipe for oxygen jet will be mixed with air to the inside of a short time.

[0008] Consequently, it can install near the burners, such as a metal fusion furnace, and oxygen enrichment combustion can be performed now by space-saving.

[0009] [Embodiment of the Invention] Drawing shows 1 operation gestalt of this invention, and drawing 1 is the schematic diagram of an important section. This oxygen enricher attaches the pipe for oxygen jet (2) to the air supply way for combustion (1) of combustion burner (illustration abbreviation) HE arranged to burners, such as a metal fusion furnace, and is constituted.

[0010] As shown in drawing 2, while the pipe for oxygen jet (2) fixes an end flange (4) with an oxygen supply way (3) to the end section, the fixed flange (5) of air supply way (1) HE for combustion is fixed to the side edge section approach which is fixing this end flange (4), and the other end is blockaded and constituted.

[0011] And in the condition that two or more oxygen jet holes (6) meet the axial center of the pipe for oxygen jet (2), two trains are aligned and it has formed in the peripheral surface corresponding to the upstream of the airstream for combustion in the peripheral surface of the pipe for oxygen jet (2) which has rushed in into the air supply way for combustion (1). As shown in drawing 3, opening of the oxygen jet hole (6) of each train is carried out to the location where the aperture include angle (theta) in the medial axis of the pipe for oxygen jet (2) turns into 45 degrees, respectively to the flow direction of the combustion air which flows the inside of the air supply way for combustion (1). In addition, the location whose aperture include angle is 0 times serves as a stagnation point.

[0012] Moreover, the oxygen jet hole (6) in each train is formed so that it goes outside towards meeting the axis of the pipe for oxygen jet (2) from the flow core of a combustion air, and spacing of \*\*\*\*\* oxygen jet holes (6) may become large.

[0013] The flow control valve of the oxygen which has arranged the sign in drawing (7) on the oxygen supply way (3), and (8) are sources of oxygen, such as an air separation plant and an oxygen storage container.

[0014] Thus, although oxygen is added from the pipe for oxygen jet (2) in the constituted oxygen enricher to the combustion air which flows the inside of the air supply way for combustion (1). At this time, an oxygen jet hole (6) from having carried out opening to the peripheral surface of the oxygen jet pipe (2) located in the improvement style side in a way to which a combustion air flows oxygen being added by the condition of moving against the flow of a combustion air, and by turbulent flow formation by the back wash accompanying exfoliation of the combustion air which flows along the front face of the pipe for oxygen jet. Since a combustion air and the added oxygen gas will be mixed, it can mix from the installation location of the pipe for oxygen jet (2) to homogeneity in about 1m, for example.

[0015] Moreover, homogeneity mixing can be made easy to be able to equate the passage cross section of the air supply way for combustion (1) provided with each oxygen jet hole (6), i.e., the flow rate of a combustion air, and to carry out, since it has formed so that it goes by oxygen enricher of this configuration outside towards meeting the axis of the pipe for oxygen jet (2) from the flow core of a combustion air, and spacing of \*\*\*\*\* oxygen jet holes (6) may become large.

[0016] Although opening of the oxygen jet hole (6) is carried out to the location where the aperture include angle (theta) to the flow direction of the combustion air in the medial axis of the pipe for oxygen jet (2) turns into 45 degrees, respectively with the above-mentioned operation gesture, the aperture include angle (theta) to the flow direction of the combustion air in the medial axis of the pipe for oxygen jet (2) should just carry out opening of this oxygen jet hole (6) to the range which is 30 - 60 degrees. When are arranged at the condition that a cylinder intersects perpendicularly in a parallel flow, and this has an aperture include angle narrower than 30 degrees in the cylinder medial-axis part to that the aperture include angle (theta) in the cylinder medial-axis part to a flow direction becomes [ a pressure ] the lowest at nearly 70 degrees, and a flow direction, it is because it is easy to be influenced of the dynamic pressure of a parallel flow.

[0017] [Effect of the Invention] The pipe for oxygen jet is made to rush in into the air supply way for combustion in the condition of intersecting perpendicularly with the flow direction (elementary stream) of the combustion air which flows the inside of the air supply way for combustion in this invention. Since it arranges in the condition of meeting the axial center of the pipe for oxygen jet, to the peripheral surface of the pipe for oxygen jet located in the improvement style side in a way to which a combustion air flows, two or more oxygen jet holes. By turbulent flow formation by the airstream which flows along the front face of the pipe for oxygen jet exfoliating, the oxygen added from the pipe for oxygen jet will be mixed with air to the inside of a short time. Consequently, it can install near the burners, such as a metal fusion furnace, and oxygen enrichment combustion can be performed now by space-saving.

[Translation done.]

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TECHNICAL FIELD

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[Field of the Invention] This invention relates to the oxygen enricher which adds oxygen to a combustion air in order to burn a fuel in the state of oxygen enrichment with a metal fusion furnace etc.

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PRIOR ART

[Description of the Prior Art] In order to raise dissolution effectiveness, he uses oxygen enrichment air as a combustion air, and is trying to acquire an elevated temperature with metal dissolution equipment in recent years. And in order to acquire oxygen enrichment air conventionally, what the nitrogen adsorbent was used [ what ] and decreased the nitrogen content in atmospheric air is used as a combustion air, or oxygen is added to the atmospheric air which is flowing as a combustion air.

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**EFFECT OF THE INVENTION**

[Effect of the Invention] Since two or more oxygen jet holes are arranged at the condition of meeting the axial center of the pipe for oxygen jet, to the peripheral surface of the pipe for oxygen jet located in the improvement style side in a way to which a combustion air flows by making the pipe for oxygen jet rush in into the air supply way for combustion in the condition of intersecting perpendicularly with the flow direction (elementary stream) of the combustion air which flows the inside of the air supply way for combustion in this invention By turbulent flow formation by the airstream which flows along the front face of the pipe for oxygen jet exfoliating, the oxygen added from the pipe for oxygen jet will be mixed with air to the inside of a short time. Consequently, it can install near the burners, such as a metal fusion furnace, and oxygen enrichment combustion can be performed now by space-saving.

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**TECHNICAL PROBLEM**

[Problem(s) to be Solved by the Invention] However, at some which adsorb a nitrogen component and change the ratio of oxygen and nitrogen, with a condition, environmental temperature, etc. of an adsorbent, since variation will arise in the adsorption capacity force, there is a problem that playback or exchange of an adsorbent must be performed frequently, the top where it is difficult to acquire the stable combustion condition.

[0004] Moreover, although an oxygen jet nozzle is made to face the air conduit for combustion, oxygen gas is blown into the combustion air which is flowing from an oxygen nozzle and he is trying to raise the rate of an oxygen ratio in a combustion air in the former when adding oxygen to the atmospheric air taken in as a combustion air, there is a problem that it is difficult to carry out homogeneity mixing only by adding oxygen gas simply even when adding several% of oxygen, and piping long for homogeneity mixing is needed.

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## MEANS

[Means for Solving the Problem] In order to attain the above-mentioned purpose, this invention makes the pipe for oxygen jet rush into a combustion burner on the air-supply way for combustion which supplies a combustion air at the condition intersect perpendicularly with the elementary stream of a combustion air, and arranges two or more oxygen jet holes towards meeting the axis of the pipe for oxygen jet to the peripheral surface of the pipe for oxygen jet located in the improvement style side in a way to which a combustion air flows, and it is carrying out having made the free passage connection of the pipe for oxygen jet at an oxygen supply as the description.

[Translation done.]

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## OPERATION

[Function of the Invention] The pipe for oxygen jet is made to rush in into the air supply way for combustion in the condition of intersecting perpendicularly with the flow direction (elementary stream) of the combustion air which flows the inside of the air supply way for combustion in this invention. Since it arranges in the condition of meeting the axial center of the pipe for oxygen jet, to the peripheral surface of the pipe for oxygen jet located in the improvement style side in a way to which a combustion air flows, two or more oxygen jet holes By turbulent flow formation by the airstream which flows along the front face of the pipe for oxygen jet exfoliating, the oxygen from the pipe for oxygen jet will be mixed with air to the inside of a short time.

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## DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the schematic diagram of an important section showing 1 operation gestalt of this invention.

[Drawing 2] It is the drawing perspective view of the pipe for oxygen jet.

[Drawing 3] It is the III-III line sectional view of drawing 1.

[Description of Notations]

1 [ -- Aperture include angle. ] -- The air supply way for combustion, 2 -- The pipe for oxygen jet, 6 -- An oxygen jet hole, theta

[Translation done.]

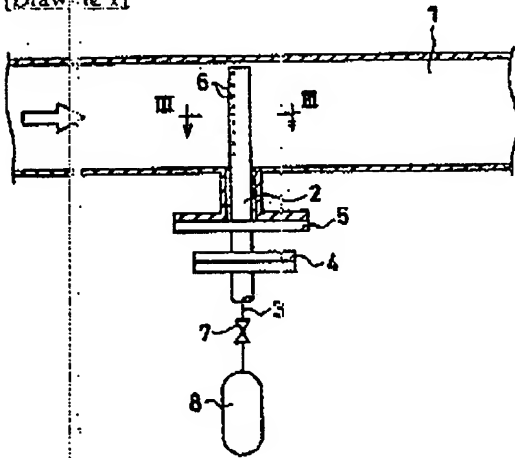
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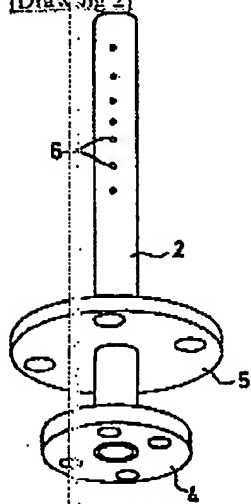
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## DRAWINGS

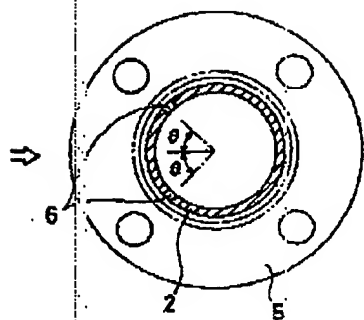
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Transition done.]

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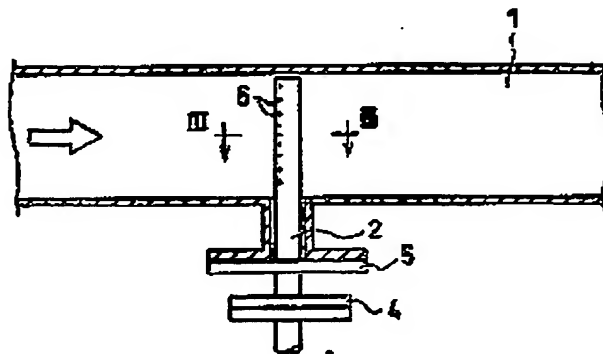
Fターム(参考) 4F033 AA13 B401 DA05 EA06

(54) 【発明の名称】 燃焼用空気での酸素富化装置

(57) 【要約】

【課題】 添加した酸素ガスと燃焼用空気とを短い距離で均一に混合できる酸素富化装置を提供する。

【解決手段】 燃焼バーナに燃焼用空気を供給する燃焼用空気供給路(1)に酸素噴出用パイプ(2)を燃焼用空気の流線と直交する状態に突入させる。燃焼用空気の流れ方向上流側に位置する酸素噴出用パイプ(2)の周面に複数の酸素噴出孔(6)を酸素噴出用パイプ(2)の軸芯に沿う方向で配置する。酸素噴出用パイプ(2)を酸素供給源に流路接続する。





(2)

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## 【特許請求の範囲】

【請求項1】 燃焼バーナに燃焼用空気を供給する燃焼用空気供給路(1)に酸素噴出用パイプ(2)を燃焼用空気の流線と直交する状態に突入させ、燃焼用空気の流れ方向上流側に位置する酸素噴出用パイプ(2)の周面に複数の酸素噴出孔(6)を酸素噴出用パイプ(2)の軸芯に沿う方向で配置し、酸素噴出用パイプ(2)を酸素供給源に連続接続してある燃焼用空気での酸素富化装置。

【請求項2】 酸素噴出用パイプ(2)の中心軸を通る燃焼用空気の流れ方向に対して酸素噴出用パイプ(2)の中心軸での開き角度( $\theta$ )が30°～60°の範囲に酸素噴出孔(6)を開口させた請求項1に記載の燃焼用空気での酸素富化装置。

【請求項3】 燃焼用空気の流れ方向上流側に位置する酸素噴出用パイプ(2)の周面に複数の酸素噴出孔(6)を酸素噴出用パイプ(2)の軸芯に沿う方向で複数列に配置した請求項1または2に記載の燃焼用空気での酸素富化装置。

【請求項4】 燃焼用空気供給路(1)での流れ中心から周縁方向に外れるにしたがって隣合う酸素噴出孔(6)同士の間隔を大きくしてある請求項1～3のいずれか1項に記載の燃焼用空気での酸素富化装置。

## 【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、金属溶解炉等で燃料を酸素富化状態で燃焼させるために燃焼用空気に酸素を添加する酸素富化装置に関する。

【0002】

【従来の技術】 近年、金属溶解装置等では、溶解効率を向上させるために、酸素富化空気を燃焼用空気として使用し、高温を得るようにしている。そして従来の、酸素富化空気を得るために、窒素吸着剤を用いて大気中の窒素分を減少させたものを燃焼用空気として使用したり、燃焼用空気として流れている大気に酸素を添加したりしている。

【0003】

【発明が解決しようとする課題】 ところが、窒素成分を吸着して酸素・窒素の比率を変えるものでは、吸着剤の状態で環境温度等で、吸着能力にバラツキが生じることになるため、安定した燃焼状態を得ることが難しい。

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【0005】 本発明はこのような点に着目して、添加した酸素ガスと燃焼用空気とを短い距離で均一に混合できる酸素富化装置を提供することを目的とする。

【0006】

【課題を解決するための手段】 上述の目的を達成するために本発明は、燃焼バーナに燃焼用空気を供給する燃焼用空気供給路に酸素噴出用パイプを燃焼用空気の流線と直交する状態に突入させ、燃焼用空気の流れ方向上流側に位置する酸素噴出用パイプの周面に複数の酸素噴出孔を酸素噴出用パイプの軸芯に沿う方向で配置し、酸素噴出用パイプを酸素供給源に連続接続したことを特徴としている。

【0007】

【発明の作用】 本発明では、燃焼用空気供給路内を流れる燃焼用空気の流れ方向(流線)と直交する状態で酸素噴出用パイプを燃焼用空気供給路内に突入させ、燃焼用空気の流れ方向上流側に位置する酸素噴出用パイプの周面に複数の酸素噴出孔を酸素噴出用パイプの軸芯に沿う状態に配置してあるので、酸素噴出用パイプからの酸素は酸素噴出用パイプの表面に沿って流れる空気流が剥離することによる乱流形成により、空気と短時間のうちに混合することになる。

【0008】 この結果、金属溶解炉等の燃焼装置の近傍に設置することができ、酸素富化燃焼を省スペースで行えるようになる。

【0009】

【発明の実施の形態】 図は本発明の一実施形態を示し、図1は要部の概略図である。この酸素富化装置は、金属溶解炉等の燃焼装置に配置した燃焼バーナ(図示略)への燃焼用空気供給路(1)に酸素噴出用パイプ(2)を組付けて構成してある。

【0010】 酸素噴出用パイプ(2)は、図2に示すように、一端部に酸素供給路(3)との接続フランジ(4)を固定するとともに、この接続フランジ(4)を固定している側端部寄りに燃焼用空気供給路(1)への固定フランジ(5)を固定してあり、他端部は閉塞して構成してある。

【0011】 そして、燃焼用空気供給路(1)内に突入している酸素噴出用パイプ(2)の周面での、燃焼用空気流の上流側に対応する周面に、複数の酸素噴出孔(6)が酸素噴出用パイプ(2)の軸芯に沿う状態で2列に整列させ

(3)

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酸素の流量調整弁、(8)は空気分離装置や酸素貯蔵容器等の酸素源である。

【0014】このように構成した酸素富化装置では、燃焼用空気供給路(1)内を流れる燃焼用空気に酸素噴出用パイプ(2)から酸素を添加するが、このとき酸素噴出孔(6)は燃焼用空気の流れ方向上流側に位置する酸素噴出パイプ(2)の周面に開口してあることから、燃焼用空気の流れに逆行する状態に酸素が添加され、酸素噴出用パイプの表面に沿って流れる燃焼用空気の側面に伴う後流での乱流形成によって、燃焼用空気と添加された酸素ガスとが混合することになるから、例えば酸素噴出用パイプ(2)の設置位置から1m程度の範囲で均一に混合できることになる。

【0015】また、この構成の酸素富化装置では、燃焼用空気の流れ中心から酸素噴出用パイプ(2)の軸芯に沿う方向で外側に行くほど隣合う酸素噴出孔(6)同士の間隔が広くなるように形成してあることから、各酸素噴出孔(6)でまかなう燃焼用空気供給路(1)の流路断面積、すなわち燃焼用空気の流量を均等化することができ、均一混合しやすくすることができる。

【0016】上述の実施形態では、酸素噴出孔(6)を酸素噴出用パイプ(2)の中心軸での燃焼用空気の流れ方向に対する開き角度( $\theta$ )がそれぞれ45度となる位置に開口しているが、この酸素噴出孔(6)は酸素噴出用パイプ(2)の中心軸での燃焼用空気の流れ方向に対する開き角度( $\theta$ )が30~60度の範囲に開口すればよい。これは\*

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\* 平行流中に円柱が直交する状態に配置されている場合、流れ方向に対する円柱中心軸部分での開き角度( $\theta$ )が70度近辺で圧力が最も低くなること、流れ方向に対する円柱中心軸部分での開き角度が30度よりも狭いと平行流の動圧の影響を受けやすいためである。

【0017】

【発明の効果】本発明では、燃焼用空気供給路内を流れる燃焼用空気の流れ方向(流線)と直交する状態で酸素噴出用パイプを燃焼用空気供給路内に突入させ、燃焼用空気の流れ方向上流側に位置する酸素噴出用パイプの周面に複数の酸素噴出孔を酸素噴出用パイプの軸心に沿う状態に配置してあるので、酸素噴出用パイプから添加された酸素は酸素噴出用パイプの表面に沿って流れる空気流が調節することによる乱流形成により、空気と短時間のうちに混合することになる。この結果、金属溶解炉等の燃焼装置の近傍に設置することができ、酸素富化燃焼を省スペースで行えるようになる。

【図面の簡単な説明】

【図1】本発明の一実施形態を示す要部の概略図である。

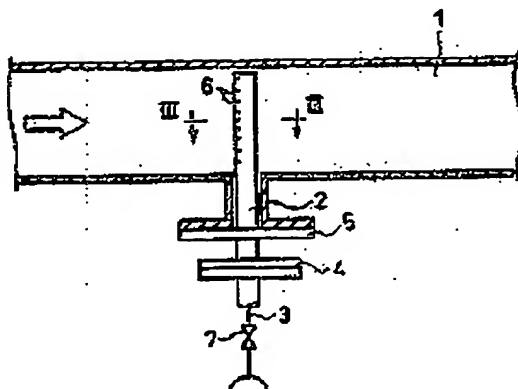
【図2】酸素噴出用パイプの取出し斜視図である。

【図3】図1のIII-III線断面図である。

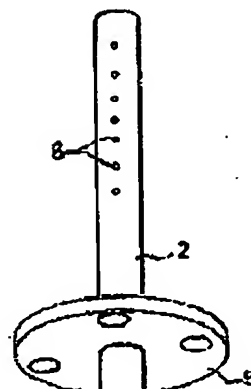
【符号の説明】

1…燃焼用空気供給路、2…酸素噴出用パイプ、6…酸素噴出孔、 $\theta$ …開き角度。

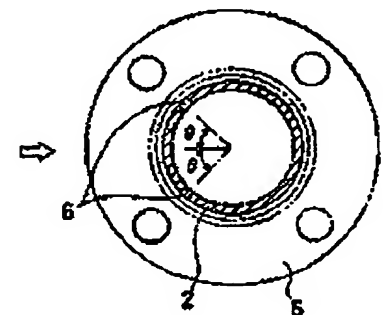
【図1】



【図2】



【図3】



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